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TO: THE U. S. PATENT & TRADEMARK OFFICE
FROM: THE DOW CHEMICAL COMPANY; Auburn Hills,
Michigan

OFFICIAL**DATE OF TRANSMISSION: 5/5/04****DOW DOCKET NUMBER: 44563A****APPLICATION SERIAL NUMBER: 10/051,417****TYPE OF COMMUNICATION: Reply Brief****NO. OF PAGES OF TRANSMISSION INCLUDING THIS COVER SHEET: 31****NAME OF PTO CONTACT: Examiner Kyle M. Riddle****TELEPHONE NUMBER FOR PTO CONTACT: 703/306-3409****FAX NUMBER FOR PTO CONTACT: (703) 872-9306 (centralized fax no.)****INTELLECTUAL PROPERTY INFORMATION:****INTELLECTUAL PROPERTY RETURN FAX NUMBER: (248) 391-6550****CONTACT PERSON: Norman L. Sims****CONTACT PERSON TELEPHONE NUMBER: (248) 391-6455**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

OFFICIAL

Appl. No. : 10/051/417 Confirmation No. 9081
Applicant (s) : Bart R. Jones et al.
Filed : January 17, 2002
TC/A.U. : 3748
Examiner : Kyle M. Riddle
Title : ADHESIVELY BONDED VALVE COVER CYLINDER HEAD
ASSEMBLY
Docket No. : 44563A
Customer No. : 00109

CERTIFICATION OF FACSIMILE TRANSMISSION
I HEREBY CERTIFY THAT THIS PAPER IS BEING FACSIMILE TRANSMITTED TO THE U.S. PATENT OFFICE ON THE DATE SHOWN BELOW:
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Sir:

REPLY BRIEF

In reply to the Examiner's Answer dated March 5, 2004, please
consider the following remarks.

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References Relied upon by Appellants

Bell, U.S. Patent 5,285,754
Kasting et al., U.S. 4,345,552
Bolsover et al., U.S. 6,302,074
Frohwerk et al., U.S. 5,957,100
Daily et al., U.S. 5,323,740
Sato et al., U.S. 5,323,745

Relative to the claims on appeal, the issue is, do the rejections make out a case of *prima facie* obviousness? Appellants contend no case of *prima facie* obviousness is established based on the rejections presented.

The primary reference Mochizuki discloses anerobically-curing adhesive sealant compositions; see col. 1, lines 65-66, which is useful for sealing parts such as the joint between an engine head and head cover, see col. 7, lines 28-29. Col. 7, lines 36-49 disclose that the compositions are designed to impregnate a sheet gasket and can retain sealing properties after cure while being pressed between flanges.

What is more important is what Mochizuki does not teach. Mochizuki provides no teaching of how valve covers are assembled to cylinder heads. The reference does provide some clues at col. 7, lines 36-49 where it is stated that a composition containing the adhesive be "pressed between flanges", and that the cured product is not broken by impact or pressure due to its high elasticity, thus maintaining superior sealing properties.

The technical issue is, does Mochizuki provide motivation to use an adhesive to bond a valve cover to an engine head wherein the adhesive has sufficient strength to hold the valve cover in place during normal operating conditions? A second issue is, does Mochizuki teach this under conditions where there are no bolt holes in the valve cover which have the primary function of holding the valve cover in place as claimed in Claims 2 and 32?

Mochizuki does not teach assembly of a valve cover to a bonded cylinder head using an adhesive wherein the adhesive has sufficient strength to hold the valve cover in place during normal operating conditions. Furthermore, Mochizuki does not teach such an assembly without bolt holes in the valve cover which have the

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primary function of holding the valve cover in place. Thus, the issue is, do the teachings of Mochizuki motivate one skilled in the art to select an adhesive having appropriate strength properties to achieve the desired function, use it to hold an engine assembly comprising a valve and an engine cylinder head using such an adhesive and with respect to Claims 2 and 32 assemble an assembly which does not utilize bolt holes in the valve cover for the purpose of holding the valve cover in place on the engine cylinder head? Appellants assert that the Official Actions and the Examiner's Answer have failed to establish such motivation. In fact, the Official Actions and the Examiner's Answer make a series of assumptions and conclusions without evidence to support the assumptions or conclusions. Assumptions and conclusions without evidence to support them are insufficient basis upon which to base a case of *prima facie* obviousness.

Obviousness must be examined in view of the state of the art at the time the invention was made. This is especially true where the primary reference, Mochizuki, discloses a particular use for the claimed composition but does not provide a disclosure as to how the composition is specifically used in the particular application. In order to assist the Honorable Board of Patent Appeals and Interferences in assessing the state of the art, Appellants will cite hereinafter passages from several references which are of record in this prosecution having been cited in Information Disclosure Statements or by the Examiner during prosecution.

Bell, U.S. Patent 5,285,754 at col. 3, lines 31-40 discloses a valve cover which is further comprised of a peripheral flange portion which has a sealing surface formed about the complete peripheral edge of the flange. In the sealing surface, there is commonly used a seal or gasket member which functions to provide sealing engagement with the cylinder head of the engine when the valve cover is secured to the cylinder head through usage of multiple clamping members or fasteners. (Reference numbers omitted). Figures 1 and 2 of Bell show bolt holes and fasteners used to hold the valve cover in place. See, in particular, reference no. 22.

Kasting et al., U.S. 4,345, 552 discloses that a small bead formed around the periphery of a rocker cover bites into the gasket when the bolt assemblies are tightened to increase the sealing capacity of the gasket. Also, col. 7, lines 1-9

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referring to Figures 2 and 3 clearly show that bosses and bolts are used to hold the rocker cover on the rocker housing and valve cover onto the cylinder head.

Bolsover et al., U.S. 6,302,074 at col. 2, lines 64 to col. 3, line 4 discloses that fasteners on the valve cover insure that the gasket is in the sealing engagement with the sealing surface about the entire perimeter of the cylinder head, (Reference numbers omitted). This passage refers to Figure 1, which clearly illustrates the holes in the cylinder head used for fastening the valve cover to the cylinder head.

Frohwerk et al. U.S. 5,957,100 at col. 1, lines 51-57 discloses a method of enhancing the connection between the elastomer of the seal and the plastic material of the cylinder head by means of adhesion and corona treatment of at least one of the surfaces to be connected. At col. 3, lines 20-41, the application discloses that pressure applied using screws is needed to allow the sealing material to properly seal the cover in place.

Daily et al., U.S. 5,323,740 at col. 2, lines 25-33 discloses that the seals combined with the grommets of the screws under controlled compression are necessary to seal the cover against oil leakage while also providing noise-reducing vibration and isolation of the cover from the engine. This reference clearly discloses 1) that compression is necessary to result in a good seal and 2) is that engine vibration causes problems with sealing.

Sato et al., U.S. 5,323,745 discloses at col. 3, lines 45-49 that valve covers are bolted to cylinder heads. It is further disclosed that the seal is subject to stress from expansion and contraction and stresses from tightening of bolts. See col. 4, lines 48-56. See also col. 7, lines 12-24.

The conclusion drawn from these references is that the state of art of assembling valve covers to cylinder heads involves using some kind of sealing material between the valve cover and the cylinder head to effectuate a seal and that mechanical fixation means such as bolts and bosses or bolt holes is necessary to hold a valve cover in place and that tightening the mechanical fixing means down is necessary for effectuating a good seal.

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With this in mind, the answer to the issue presented becomes clearer. As Mochizuki does not teach a particular process for assembling a valve cover to an engine head but instead teaches a material which is used in sealing, one skilled in the art would read the teachings of Mochizuki that the compositions disclosed would be used consistent with the prior art processes. Mochizuki supports this reading at col. 7, lines 42-49 when it discusses a composition coated or impregnated in a gasket which is then pressed between flanges.

This brings us again to the ultimate issue, where is the motivation to first select a material which has properties which Mochizuki says are undesirable, that is, has insufficient releasability, see col. 4, lines 5-6 and col. 11, lines 1-6; and to then utilize a process for assembling a valve cover to an engine head which is contrary to the recognized state of the art? The fault in the logic of the present Official Action and Rejection is that no motivation is provided to suggest such deviation from the state of the art. In fact, in the Examiner's Answer, the statements which seek to establish motivation, state that because there is a material which could have sufficient strength to hold a valve cover in place, one skilled in the art would be motivated to do this. But, in fact, the statement can only be made after the skilled artisan has seen Appellants' specification and claims, because before Appellants' specification and claims are presented to the skilled artisan, the skilled artisan has no reason whatsoever to make an assembly which comprises a cylinder head, a valve cover and an adhesive bonding the two together, wherein the adhesive has sufficient strength to hold the valve cover in place during normal operating conditions. Normal operating conditions as evidenced by the prior art cited involves significant changes in the temperature which the materials are subjected to and significant vibration during operation. The skilled artisan does recognize that such temperature and vibration conditions have a significant impact on the ability of a material to maintain a good seal during such conditions. It is clear from the prior art that the standard means of dealing with such conditions is to use mechanical fixation means such as bolts and bolt holes or bosses to hold the valve cover in place and to maintain the seal. Appellants again assert that the Official Actions and Examiner's Answer have not

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provided any motivation to the skilled artisan to move away from such means or solving the problem.

It is useful to review some of the statements made in the Examiner's Answer relative to this issue to evaluate whether a case of *prima facie* obviousness is provided. Page 4 of the Examiner's Answer in the first paragraph states:

"Mochizuki et al. fail to recite the functional language added to Claims 1, 11 and 18, specifically 'wherein the adhesive has sufficient strength to hold the valve cover in place during normal operating condition.' However, Mochizuki et al. disclose the adhesive has a holding strength of 568 psi, and additionally suggest the use thereof on a valve cover. One having ordinary skill in the art would have reasonably assumed that the suggested adhesive would hold during "normal operating conditions. Also, one having ordinary skill in the art would have reasonably assumed that holding strength would encompass the above-functional recitation. Moreover, such adhesive qualities would negate the need for bolts (re Claims 2 and 32) as a securing means to one of ordinary skill in the art."

On page 7 in the second paragraph, it is further stated: "Mochizuki does not teach or suggest the use of bolts to hold a valve cover in place as argued on page 7, last paragraph. The disclosed adhesive sealants have the necessary properties to hold a valve cover in place during normal operating conditions; otherwise their use for valve covers would not be functional. Although Mochizuki fails to elaborate on how the valve cover is held in place, the adhesive properties of the disclosed combinations include holding strength for securing the valve cover in place during operation of the engine. The arguments concerning peel

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strength continuing at the top of page 8 of the Brief have little merit since there are many examples of strong adhesive bonds that are strong in shear but weak in peel strength, such as component (C) which is a urethane type (meth)acrylate prepolymer (column 3, lines 64-68 with column 4, lines 1-6)."

The Examiner's Answer states one skilled in the art would assume that the suggested adhesive has a holding strength of 568 psi and additionally suggests the use on a valve cover. The Official Action and Examiner's Answer provide no evidence upon which assumption is based. Absent evidence upon which this assumption is based, it cannot provide the basis for motivation to modify the teaching of the primary reference to get to Appellant's invention. This assumption is contrary to the state of the art and one skilled in the art would not be expected to make an assumption and be motivated to make changes to the state of the art which are contrary to the state of the art without some reason to do so. Bottom line, the Examiner's Answer does not cite a reference which suggests using an adhesive to hold the valve cover in place which adhesive has sufficient strength to hold the valve cover in place and that this can be done in the absence of mechanical fixation means such as bolts. In the absence of such a teaching, no case of *prima facie* obviousness is supportable.

In the first quoted passage, the Examiner's Answer asserts that the adhesive has a holding strength of 568 psi. This is an incorrect statement of the teachings of the primary reference. What is disclosed is that the sealing material can have a tensile strength of not less than 10 kgf per cm², but generally not more than 40 kg per cm². Kgf per cm² converts to about 568 psi. This reference refers to tensile strength which is an internal property defining the cohesive strength of a material. This passage has no relevance relative to the adhesive strength of the material. Therefore, the conclusion that the recited material could have a "holding strength" of 568 psi is a misinterpretation of the reference. A more relevant indication of the adhesive properties or holding strength of an adhesive is a peel strength test which measures how well a material sticks to a surface when one attempts to peel that

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material from the surface. Mochizuki performs peel testing on several materials exemplified in the specification, see Table 1. Note, that in Table 1, the highest strength is listed as 2.5 kg force and most of the materials have significantly lower peel strength. Thus, in fact, the adhesive properties of these materials are much lower than the Examiner's Answer portrays. The Examiner's Answer addresses this argument by saying that peel strength is irrelevant. Yet, peel strength is a clear indication of adhesive properties. Further, in an environment where there is significant change in the thermal environment and vibration, the ability to stick to a surface is a very important property if the objective is to hold two parts; a valve cover and cylinder head, together. The Examiner says that there are many examples of strong adhesive bonds that are strong in shear and weak in peel strength, but does not indicate how this is relevant to solving the particular problem or how this fact would motivate one skilled in the art to modify the teachings of Mochizuki to get to Appellants' invention. Furthermore, it is important to recognize that the reference does not teach an adhesive which appears to be capable of holding a valve cover in place on a cylinder head under operating conditions. At best, the teachings of Mochizuki can be said to provide some clues as to how to formulate an adhesive which might meet the targets. But, the reference does not recognize such a target or the need for an adhesive to perform such a function. It is this recognition of the need for an adhesive to perform the function and then to be utilized in the claimed assembly that is necessary to create a case of *prima facie* obviousness and this is not contained in the reference or any other reference. Mochizuki clearly teaches that the function of the material described is for sealing not adhesion, see passages cited hereinbefore.

Furthermore, if there is a reference which suggests an adhesive which is weak in peel and strong in shear can be used to hold a valve cover during normal operating conditions and under conditions where the valve cover is not assembled or where the assembly is not assembled using bolts, then such a reference should be cited to support the position taken by the Examiner. The fact that no such reference has been cited indicates that no such reference exists and this ground for supporting

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motivation to modify the teachings of Mochizuki to get to Appellants' invention is not supported.

The Examiner's Answer on page 5, paragraph 3 states: "Re claim 5, Santella teaches a means for securing the assembly to aid in the bonding process (column 4, lines 14-18)." This passage refers to bonding a valve cover to a sealing flange. It is the sealing flange described which is used to seal the valve cover assembly to the cylinder head. See Figure 1 and Reference No. 14. Appellants do not understand how the cited passage relates to Claim 5 and it is not clear from any of the previous Official Actions how this is relevant. Note, that Claim 5 adds a further limitation that the valve further comprises one or more integral means for holding the valve cover in place on a cylinder head while the adhesive cures. The Examiner's Answer states on page 6, at the beginning of the fifth paragraph: "Santella teaches the use of connecting the valve cover to the head with or without fasteners." Santella does not teach that a valve cover can be connected to a cylinder without fasteners. Appellants have requested that the Examiner point out the passage that which clearly states this and the Examiner has not cited a passage which states this. The illustrated valve cover, see Figure 1 and 1(a) clearly illustrate the use of bolt holes clearly indicating the fasteners are used to hold the valve cover in place. Figure 2 also illustrates bolt holes. Figure 2(a) does not illustrate bolt holes, but col. 4, lines 8-10 clearly state that Figure 2(a) is a cut-away of Figure 2 which discloses the use of bolts to hold the valve cover in place.

The Examiner states on page 8, "If one of ordinary skill in the art cannot remove the valve cover due to insufficient peel strength and releasability, it would follow that the adhesives disclosed in Mochizuki would hold the valve cover in place during normal operating conditions of the engines. Appellants cannot have it both ways." Mochizuki in discussing the peel strength is referring to the property of releasability so that in repair of an engine the sealing material can be easily removed and replaced with new sealing material. The fact that some of the compositions tested do not have adequate releasability relates to the issue of ease of replacement of the seal. The fact that it has insufficient releasability does not suggest that the material would have sufficient adhesive properties to perform the function of the adhesives

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used in Appellants' assembly. This statement begs the question of motivation to actually use an adhesive if it has adequate properties as recited in Appellants' claims.

For the reasons stated hereinbefore, Appellants therefore assert that the Official Actions, Final Rejection and Examiner's Answer fail to establish a case of *prima facie* obviousness and that the rejection must be reversed. Appellants therefore request that the Honorable Board of Patent Appeals and Interferences reverse the rejection of Claims 1-7, 11-14, 18-23 and 26-32.



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